

Stabilized FEM for incompressible flows: Equal-order vs. inf-sup stable approximation

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A recent approach to the variational multiscale approach to incompressible flows consists in stabilization of the standard Galerkin finite element method using the local projection approach [1]. In the present paper, we take advantage of a general framework for the a-priori analysis of such methods given in [2] for linearized Navier-Stokes problems of Oseen type.

The case of equal-order approximation for velocity and pressure can be found in [1], [2]. The case of inf-sup stable finite element pairs is considered in [3]. Here, we give a critical comparison for a h/p-version of both variants. Numerical examples for incompressible Navier-Stokes flows support the discussion.

References:

- [1] M. Braack, E. Burman, “Local projection stabilization for the Oseen problem and its interpretation as a variational multiscale method”, *SIAM J. Numer. Anal.* 43, 6 (2006), 2544-2566.
- [2] G. Matthies, P. Skrzypacz, L. Tobiska “A unified convergence analysis for local projection stabilizations applied to the Oseen problem”, to appear in *M²AS* 2007.
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